

An aerial photograph of a vast ocean with deep blue water and white-capped waves. The perspective is from a high angle, looking down at the water's surface. The waves are scattered across the frame, creating a textured appearance. The sky is visible in the upper portion of the image, appearing bright and slightly hazy.

Ocean Influence on Continental Rain

W. Timothy Liu, Wenqing Tang, and Xiaosu Xie

- Drought and Flood (precipitation anomalies) must have been driven by a moisture source (from the oceans)
- The teleconnection between continental rainfall and sea surface afar must be manifested through moisture transport across the coastline
- Moisture transport may be in different directions at different levels
- Our integrated transport gives the integrated effect of the surface advection and transport aloft

HYDROLOGIC BALANCE

$$\frac{\partial W}{\partial t} + \nabla \cdot \Theta = E - P$$

$$\Theta = \frac{1}{g} \int_0^{p_0} q U dp$$

$$W = \frac{1}{g} \int_0^{p_0} q dp$$

$$\Theta = U_e W$$

Θ is equivalent to column water vapor W advected by U_e .

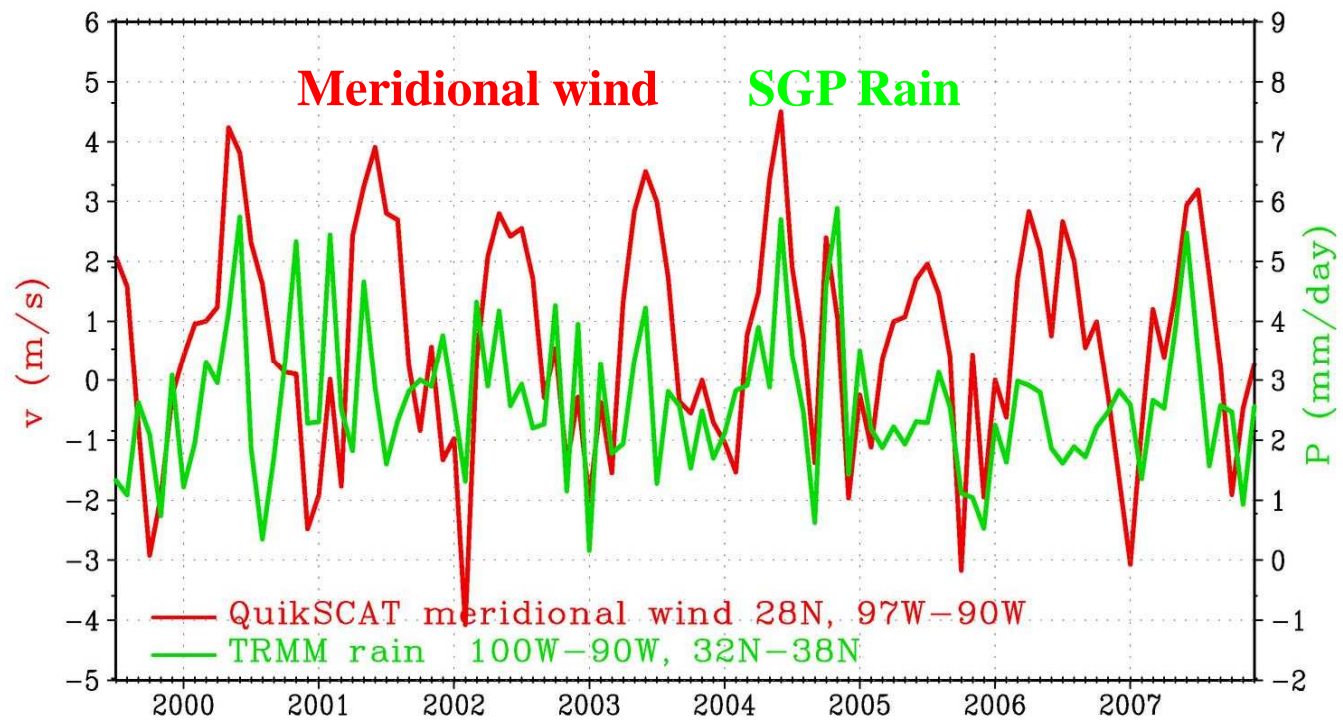
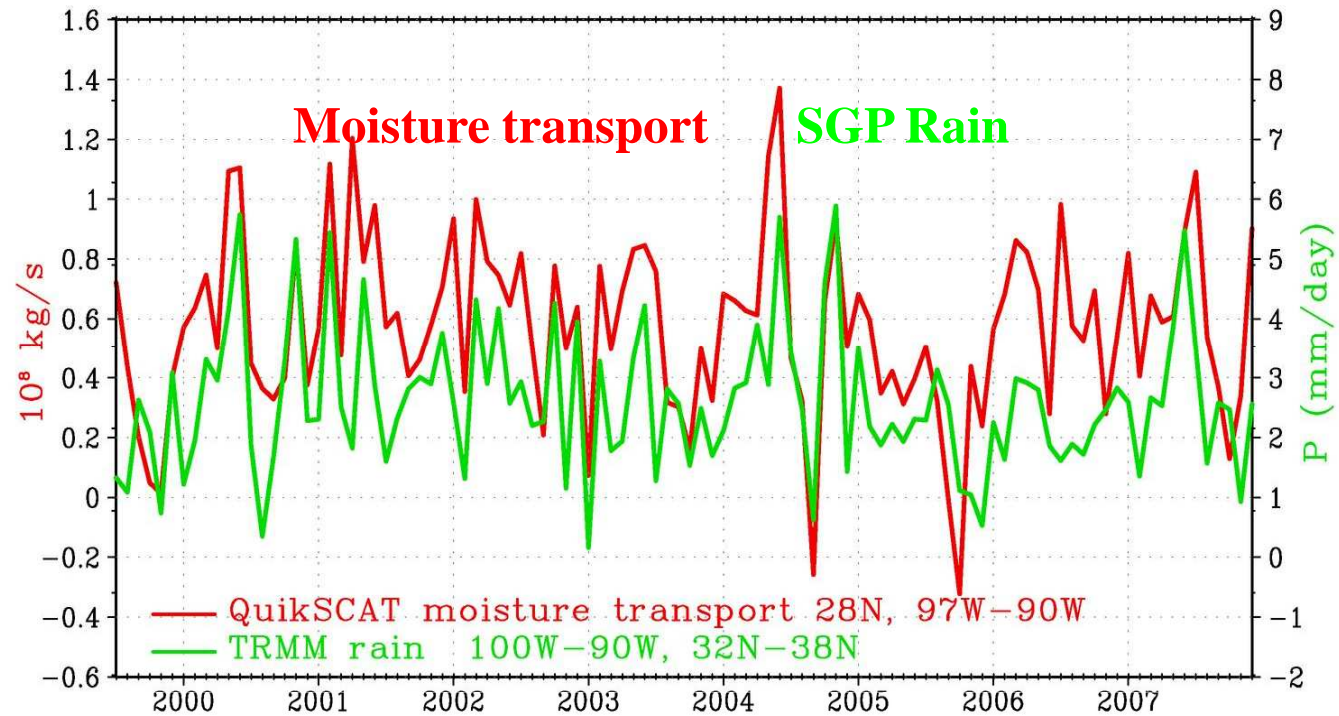
U_e is the depth-averaged wind weighted by humidity

We use SVR to relate U_e to wind at two levels:

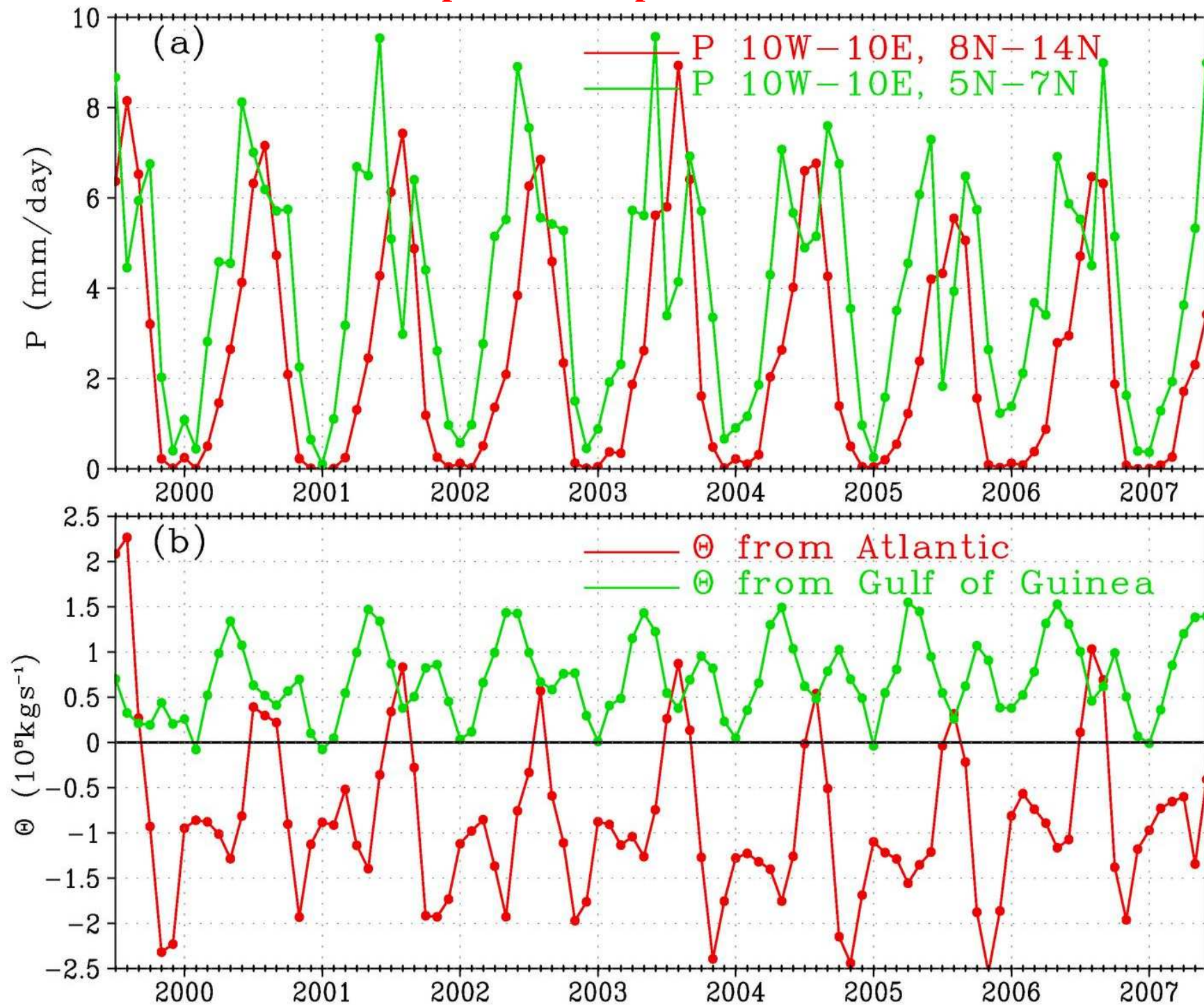
1. U_N : scatterometer surface wind stress

2. U_{850mb} : cloud drift wind (free-stream wind)

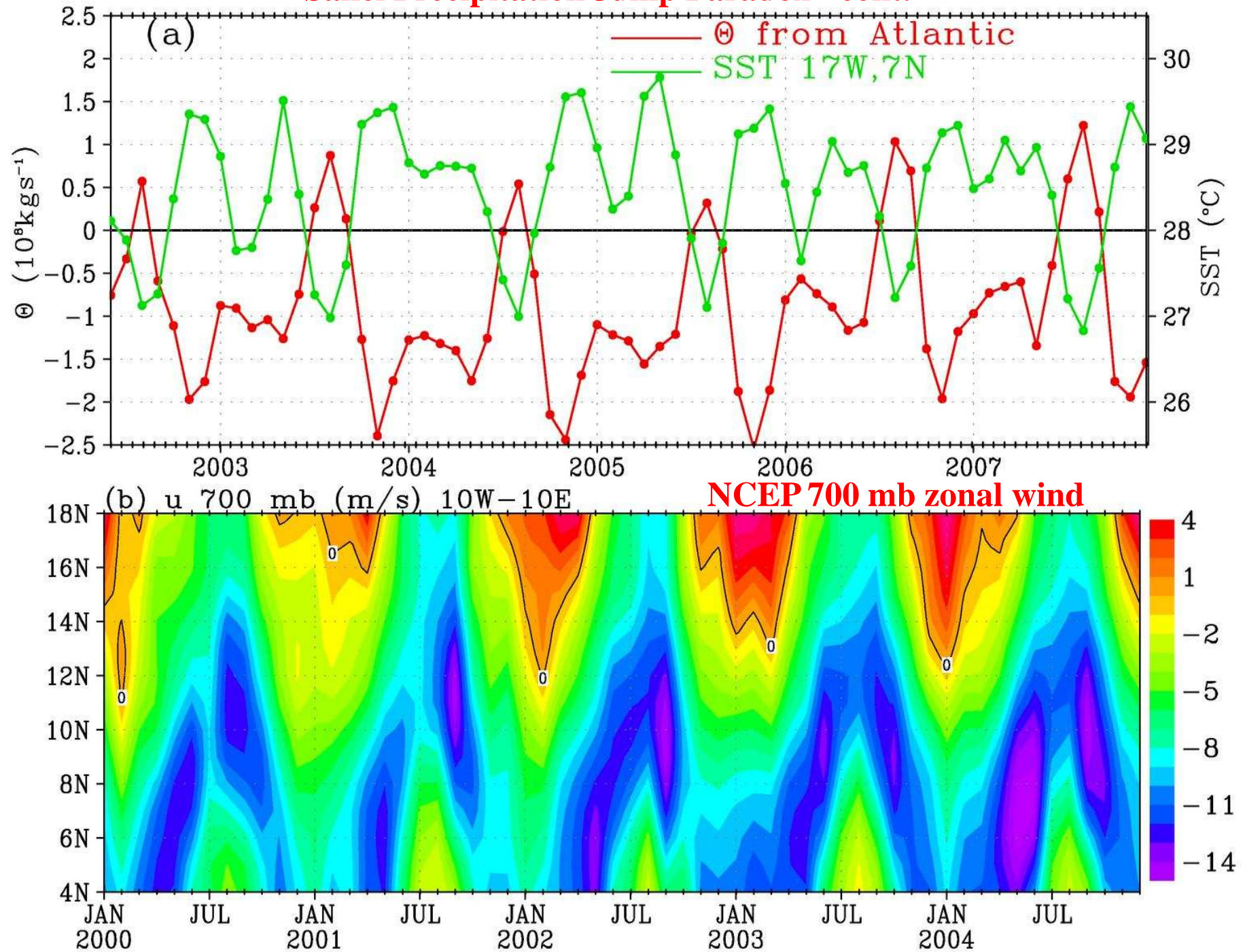
Southern Great Plains Rain Extremes



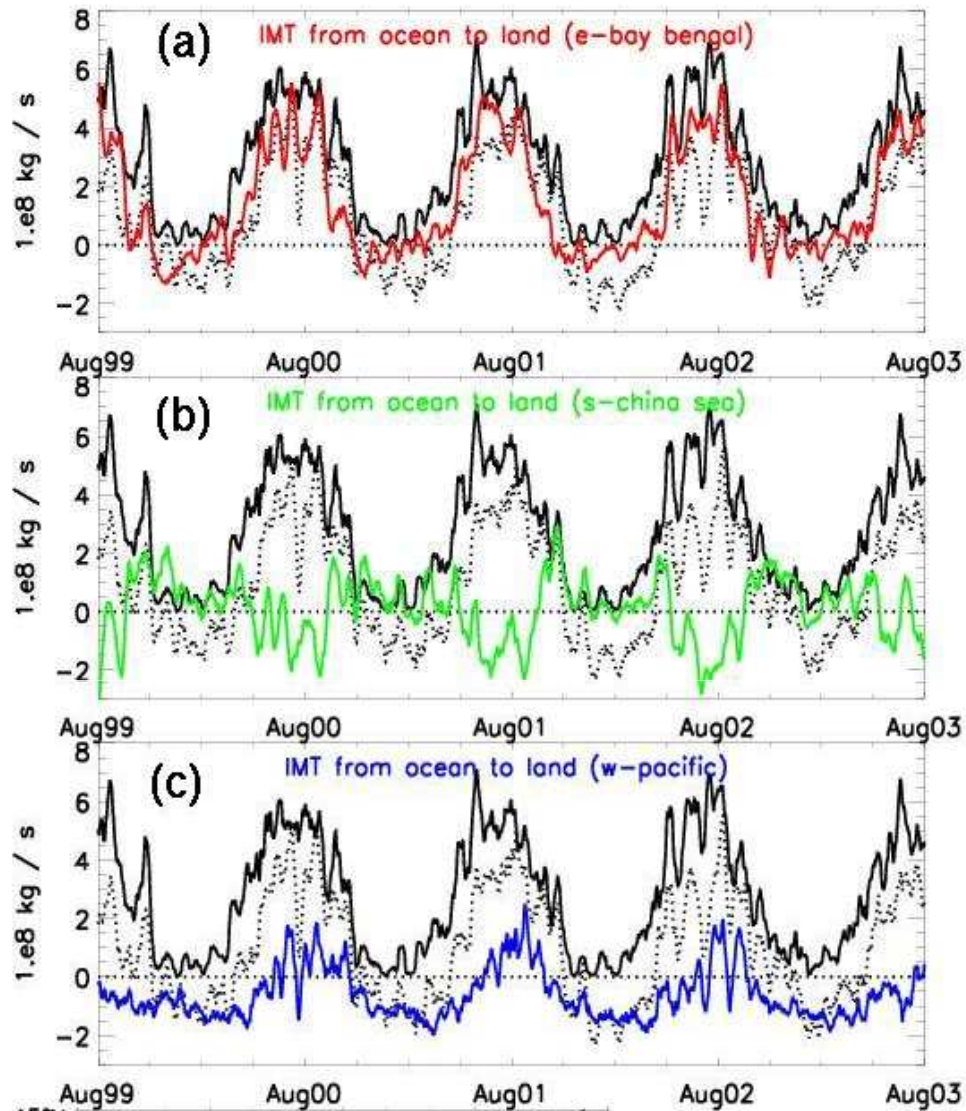
Sahel Precipitation Jump Paradox



Sahel Precipitation Jump Paradox - cont.



East Asian Monsoon



**Moisture transport from
Bay of Bengal
TRMM precipitation**

**Moisture transport from
Southern Ocean**

**Moisture transport
from Pacific**

